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**FINAL REPORT**  
**ANTENNA**  
**RADIATION PATTERN MEASUREMENTS**  
**ON THE B-47 AIRCRAFT**

**SRI PROJECT No. 606**  
**Contract No. AF 33 (616)-83, E. O. No. 112-33 SR-6F2**  
**Task V**

*Prepared for*  
**Wright Air Development Center**  
**Wright-Patterson Air Force Base**  
**Ohio**  
**April, 1953**

48

**RESTRICTED** SECURITY INFORMATION

**STANFORD RESEARCH INSTITUTE**

**STANFORD, CALIFORNIA**

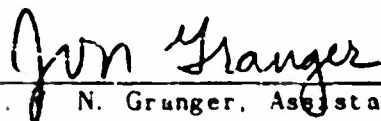
1 April 1953

Final Report, SRI Project No. 606  
Air Force Contract No. AF 33(616)-83  
Task V

**ANTENNA RADIATION PATTERN MEASUREMENTS  
ON THE B-47 AIRCRAFT**

By  
James D. Bain  
Aircraft Radiation Systems Laboratory

Approved:



J. N. Granger, Assistant Chairman  
Department of Engineering Research



T. H. Morrin,  
Director of Engineering Research

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## **ANTENNA RADIATION PATTERN MEASUREMENTS ON THE B-47 AIRCRAFT**

1 April 1953

The purpose of this study is to obtain radiation patterns of antennas for the following equipments

1. Omnirange-Localizer (AN/VRN-14 Equipment) - Collins 37J1 antenna on the top centerline of the fuselage at F.S. 390 (File Nos. B-47-VOR-115).
2. Homing (AN/APN-12 Equipment) - Five element array of stubs on the underside of the left wing (File Nos. B-47-APN12-200).
3. VHF-UHF Command Communication (WVC-3, WVC-19 Equipment) - Stub antenna on top of the vertical stabilizer. (File Nos. B-47-ST-125 to B-47-ST-375, inclusive).

A 1/20th scale model B-47 together with the antennas installed at specified locations (Fig. 1) was furnished by the Communication and Navigation Laboratory of Wright-Patterson Air Force Base

Patterns were not recorded on the DME antenna. A procedure developed at this laboratory for the measurement of higher frequency aircraft antennas, such as the DME, employs larger scale models (i.e., 1/5th scale) and permits accurate pattern recording with a minimum of difficulty. The method used to plot patterns and determine the equivalent isotropic radius on these larger scale models is described in a forthcoming report.\* For this reason Stanford Research Institute does not have facilities to record patterns at 24 kMc model frequency, as required for the B-47 model furnished.

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\* A. H. Ellis, "Reference Antenna for Use with Model Pattern Ranges," Technical Report No. 39, SRI Project 591, Contract No. AF 17(60-1) 266.

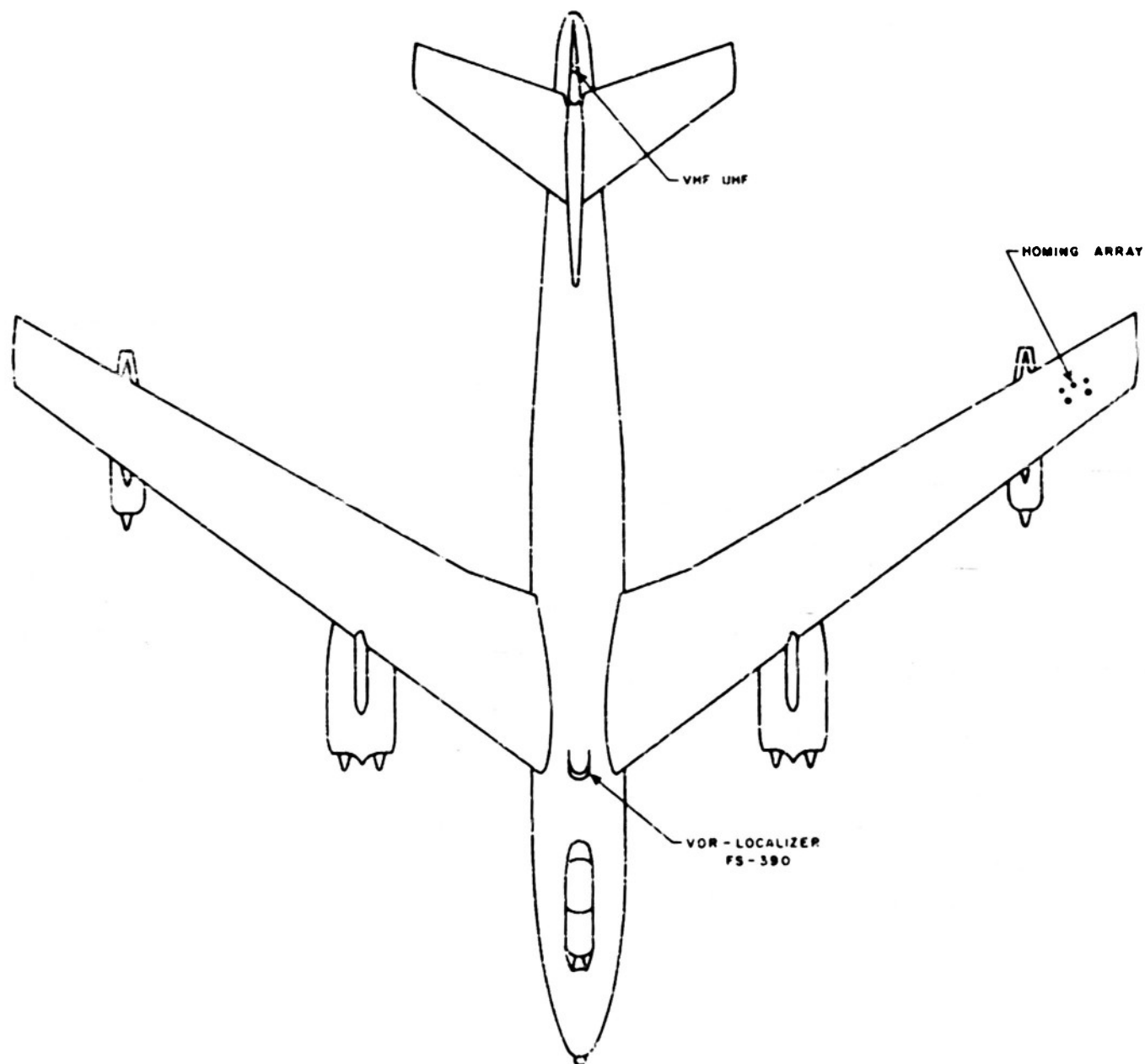


FIG. 1  
B-47 ANTENNA LOCATIONS

File No. B-47-VOR-115

Project 606E

Date 3/20/53

Aircraft Designation B-47

Antenna Type Collins 37J1 Ramshorn

Antenna Location Top Centerline F S. 390

Remarks

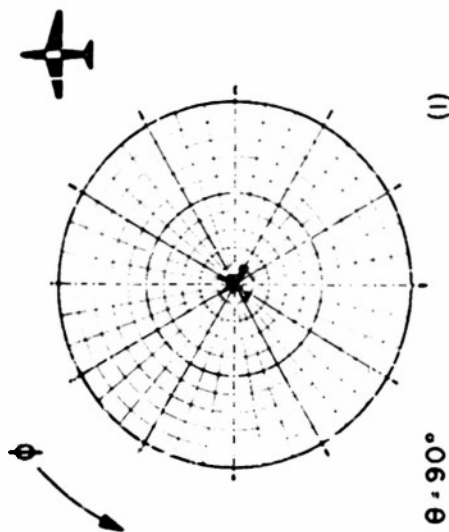
Full Scale Frequency 115 Mc

Scale Factor 20

Model Frequency 2300 Mc

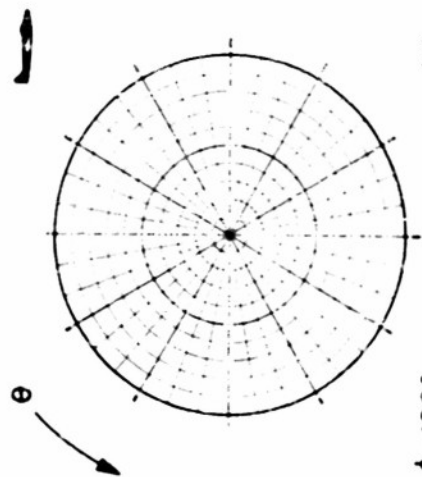
Curves Plotted In Field

Data Taken By E. Wright



(1)

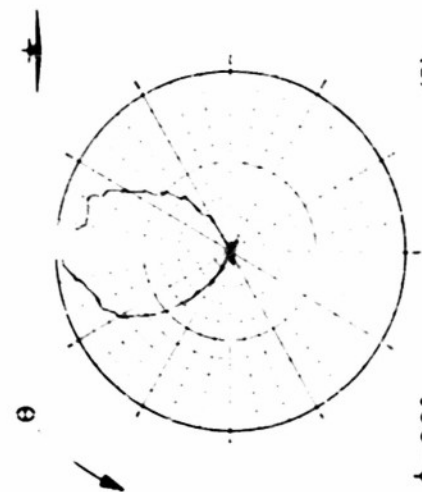
$\theta = 90^\circ$



(2)

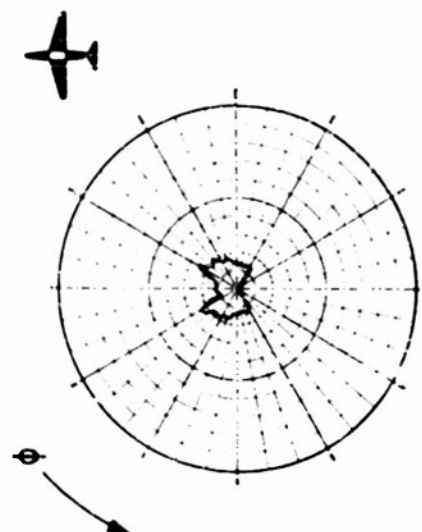
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$E_\theta$  POLARIZATION



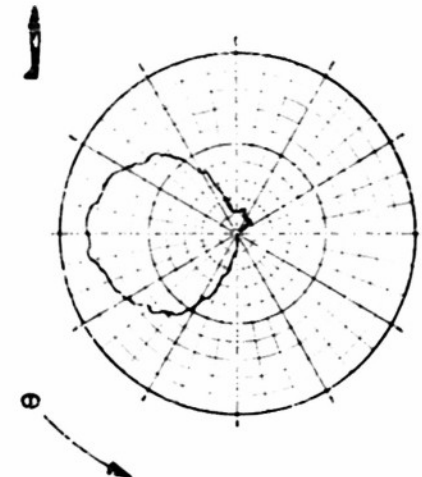
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$\phi = 90^\circ$



(24)

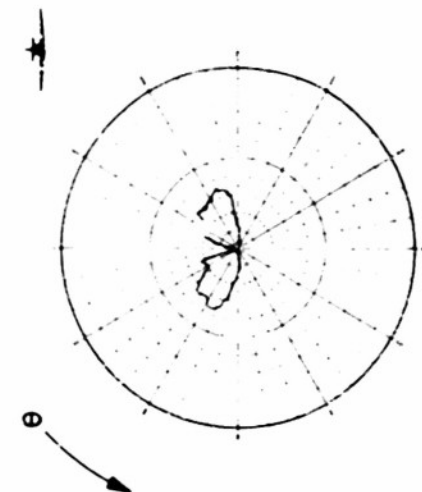
$\theta = 90^\circ$



(25)

$\phi = 180^\circ$

$E_\phi$  POLARIZATION



(26)

$\phi = 90^\circ$

FILE NOS. B47-VOR-115

UNIT 00

File No B-47-APN12-200

Project 606E

Date 3/24/53

Aircraft Designation B-47

Antenna Type Five Element Array

Antenna Location Underside of Left Wing

Remarks:

Full Scale Frequency 200 Mc

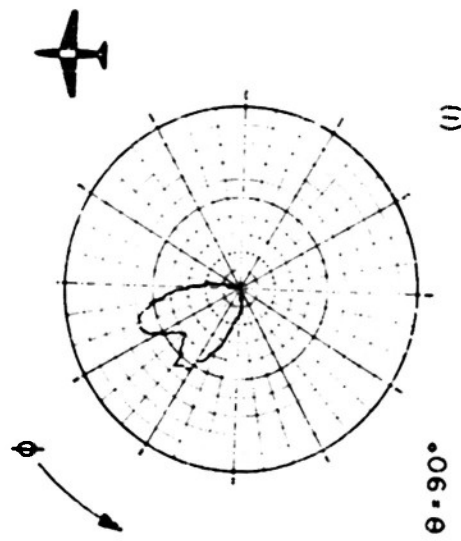
Scale Factor 20

Model Frequency 4000 Mc

Curves Plotted In. Field

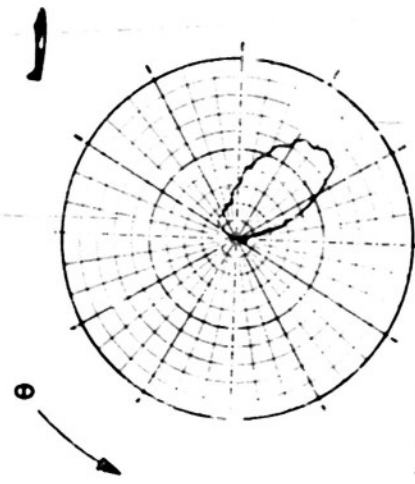
Data Taken By E. Wright





(1)

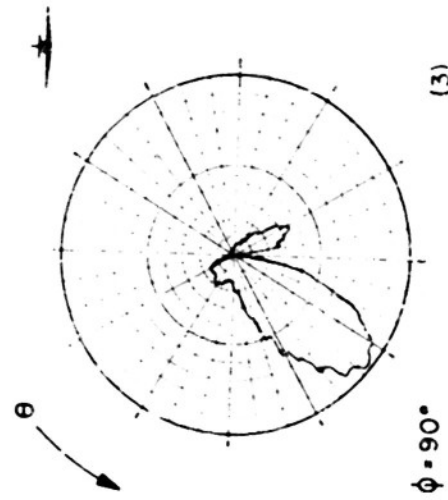
$\theta = 90^\circ$



(2)

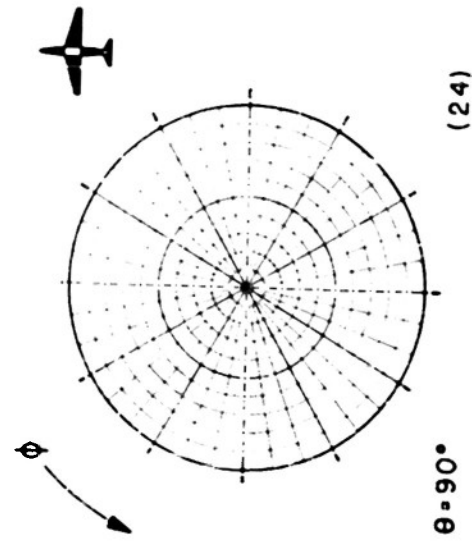
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$E_\theta$  POLARIZATION



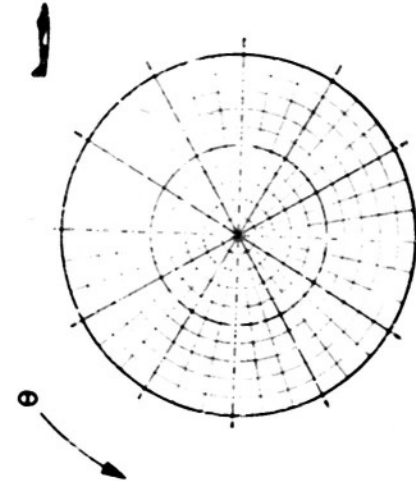
(3)

$\phi = 90^\circ$



(24)

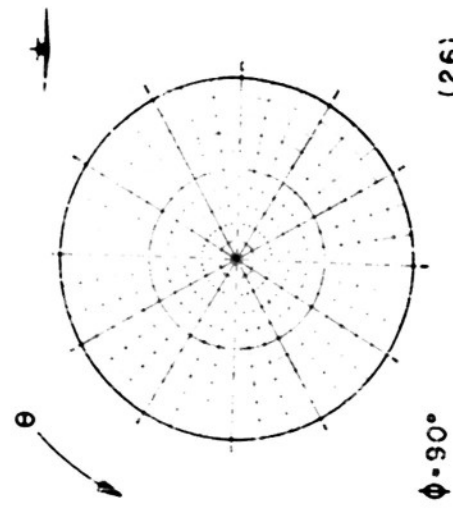
$\theta = 90^\circ$



(25)

$\phi = 180^\circ$

$E_\phi$  POLARIZATION



(26)

$\phi = 90^\circ$

FILE NOS. B47-APN12-200

File No: B-47-ST-125

Project: 606E

Date: 3/19/53

Aircraft Designation: B-47

Antenna Type: Stub

Antenna Location: Top of Vertical Stabilizer

Remarks:

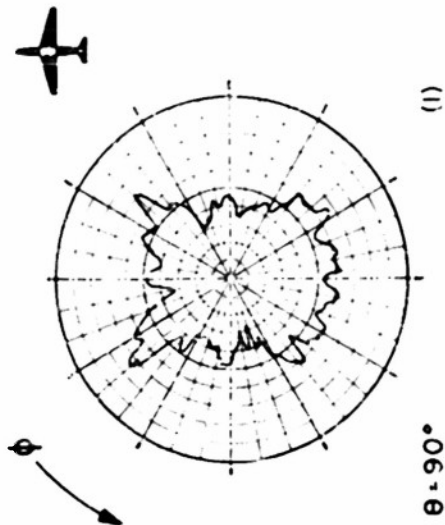
Full Scale Frequency: 125 Mc

Scale Factor: 20

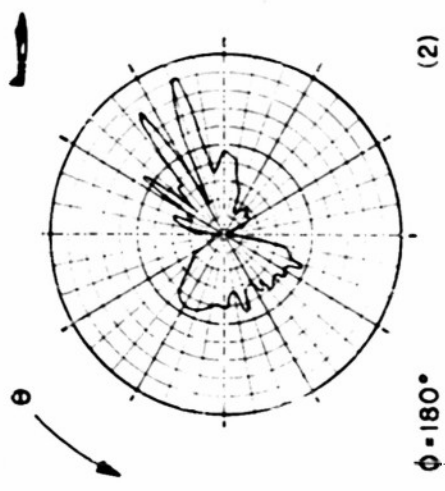
Model Frequency: 2500 Mc

Curves Plotted In: Field

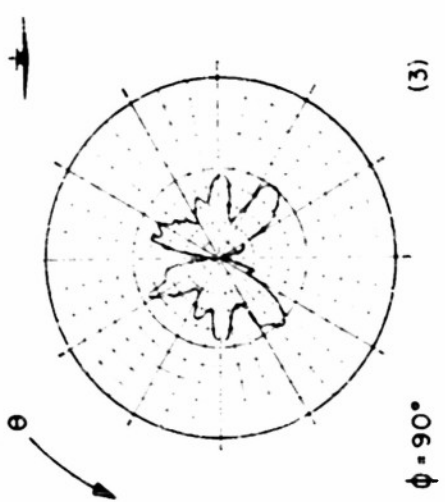
Data Taken By: E. Wright



(1)

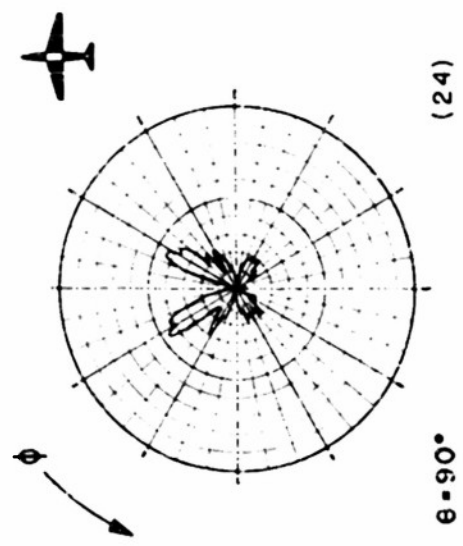


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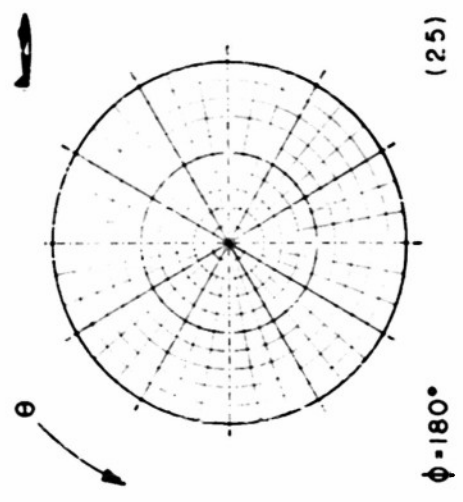


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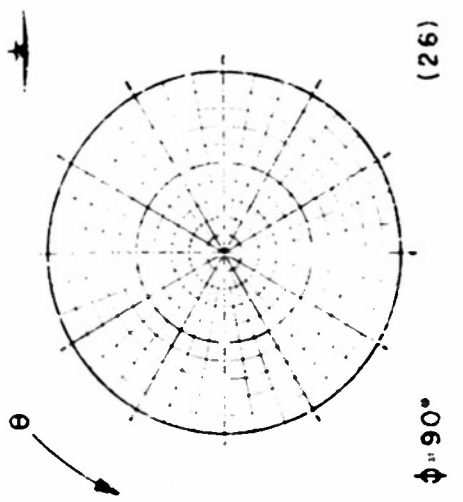
# $E_\theta$ POLARIZATION



(24)



(25)



(26)

# $E_\phi$ POLARIZATION

FILE NOS. B47-ST-125

File No: B- 47- ST- 150

Project: 606E

Date: 3/20/53

Aircraft Designation: B-47

Antenna Type: Stub

Antenna Location Top of Vertical Stabilizer

Remarks:

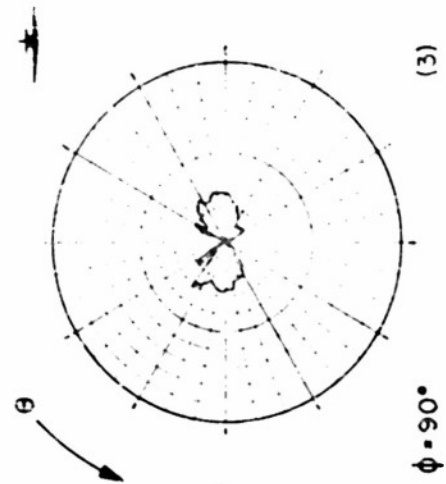
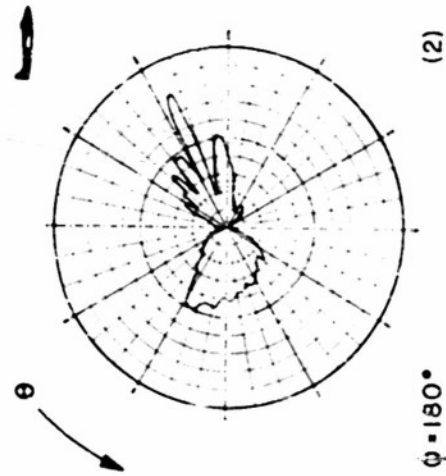
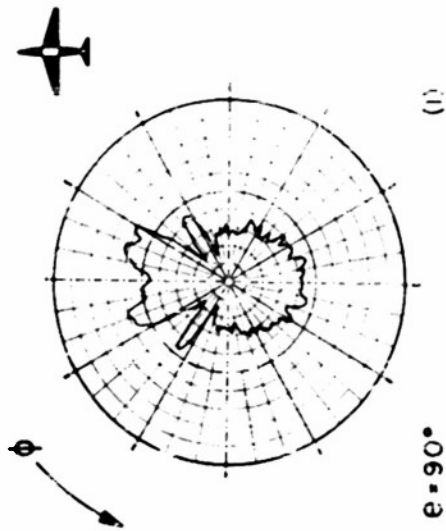
Full Scale Frequency 150 Mc

Scale Factor: 20

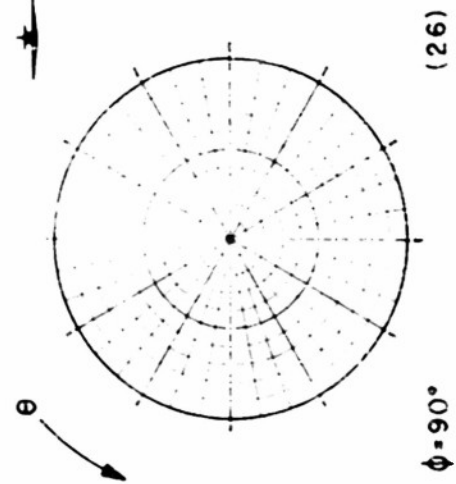
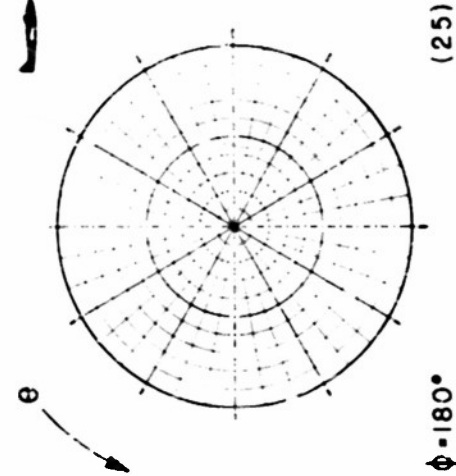
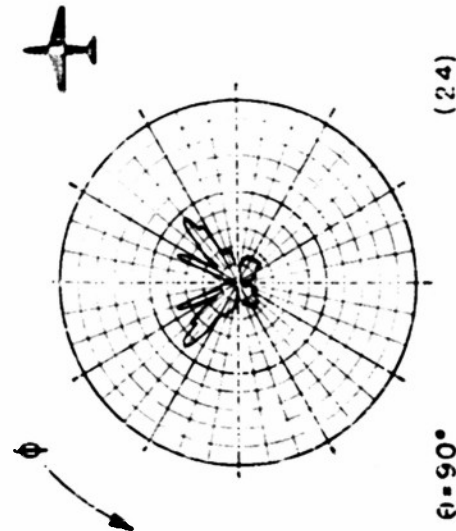
Model Frequency: 3000 Mc

Curves Plotted In: Field

Data Taken By: E Wright



$E_\theta$  POLARIZATION



$E_\phi$  POLARIZATION

FILE NOS. B47-ST-150

File No B-47-ST-250

Project 606E

Date 3/16/53

Aircraft Designation B-47

Antenna Type Stub

Antenna Location Top of Vertical Stabilizer

Remarks

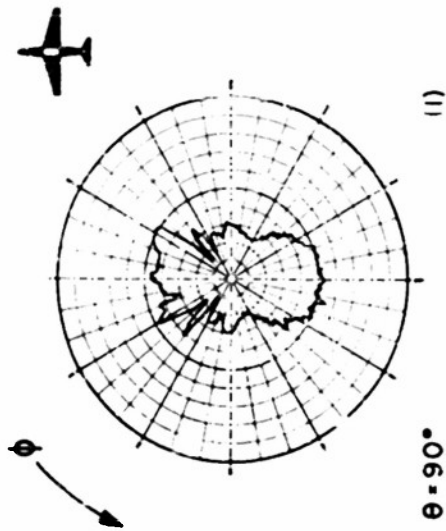
Full Scale Frequency 250 Mc

Scale Factor 20

Model Frequency 5000 Mc

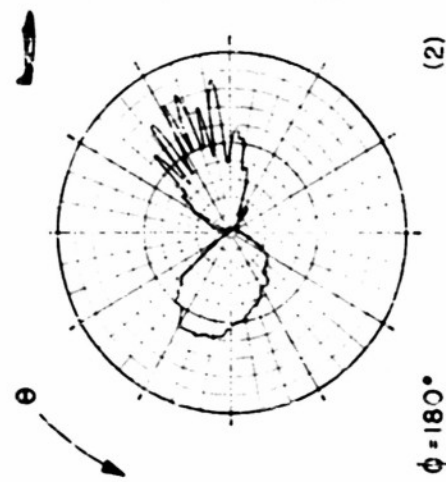
Curves Plotted in Field

Data Taken By E. Wright



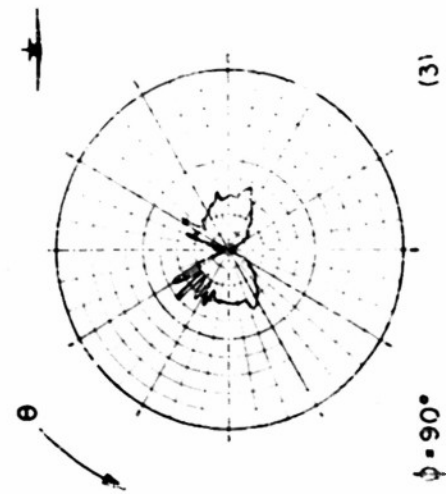
$\theta = 90^\circ$

(1)



$\phi = 180^\circ$

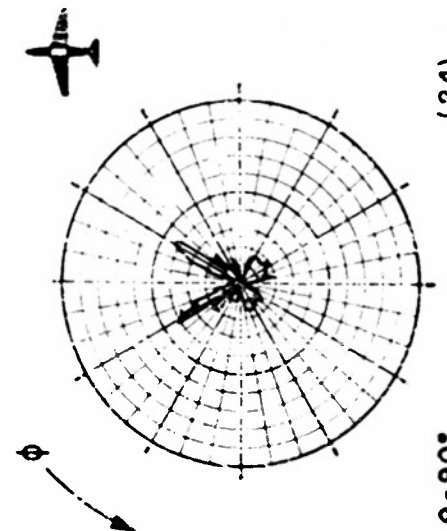
(2)



$\phi = 90^\circ$

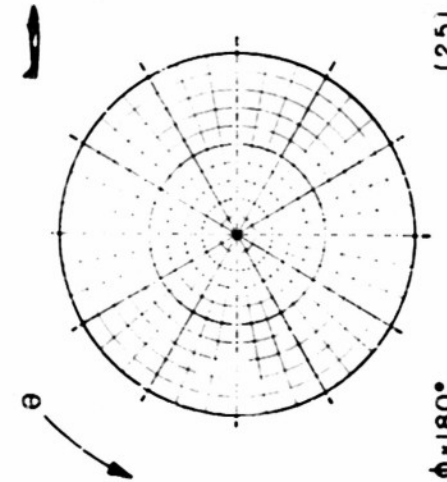
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# $E_\theta$ POLARIZATION



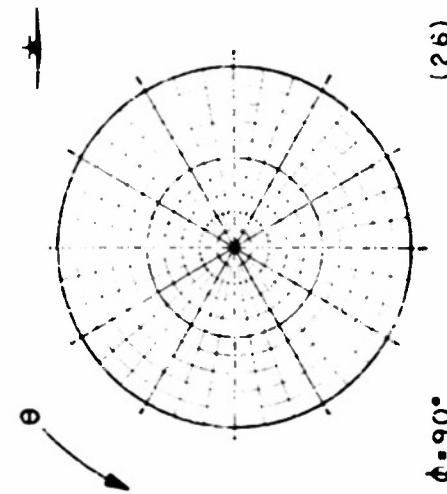
$\theta = 90^\circ$

(24)



$\phi = 180^\circ$

(25)



$\phi = 90^\circ$

(26)

# $E_\phi$ POLARIZATION

FILE NOS. B47-ST-250

W-11-10

File No. B-47-ST-350

Project: 6065

Date: 3/23/53

Aircraft Designation: B-47

Antenna Type: Stub

Antenna Location: Top of Vertical Stabilizer

Remarks:

Full Scale Frequency: 350 Mc

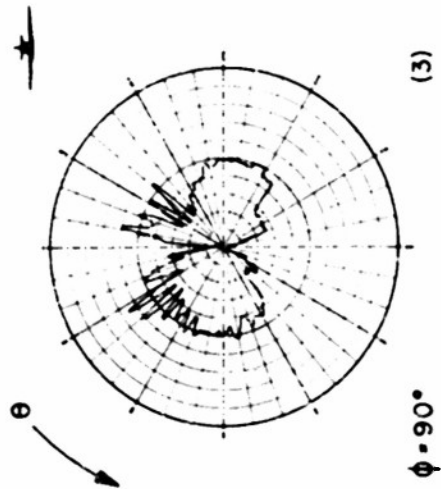
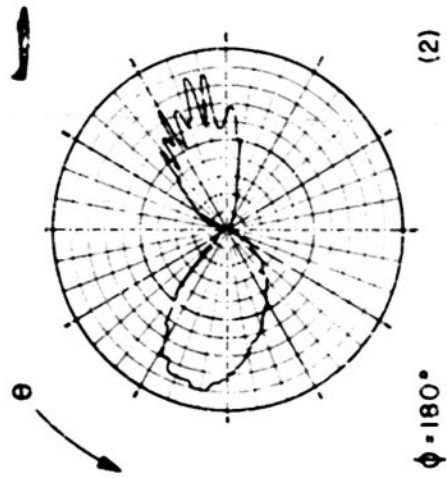
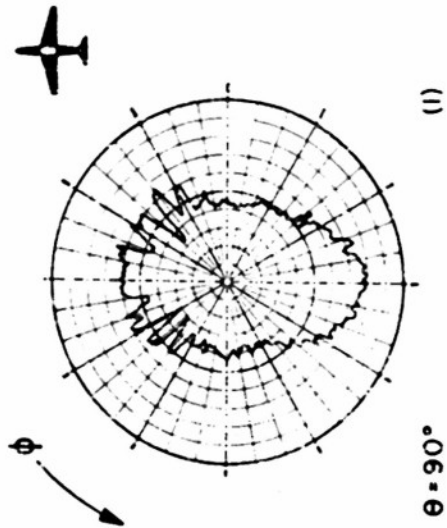
Scale Factor: 20

Model Frequency: 7000 Mc

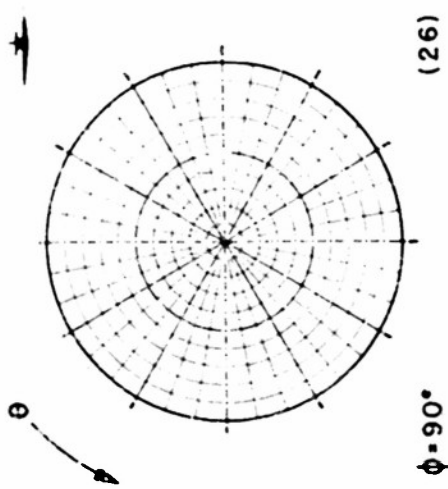
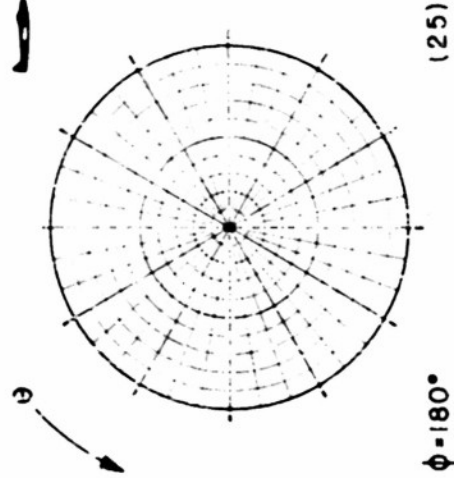
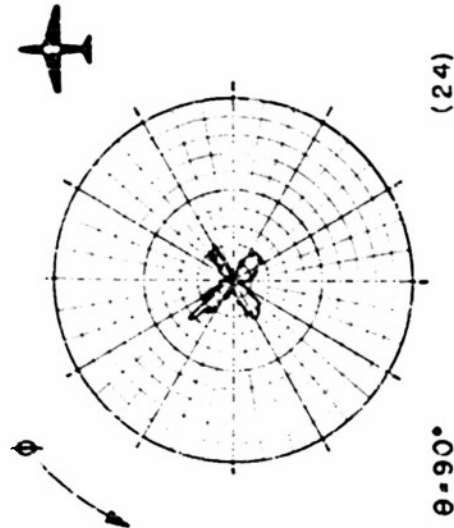
Curves Plotted In: Field

Data Taken By: E. Wright





$E_\theta$  POLARIZATION



$E_\phi$  POLARIZATION

FILE NOS. B47-ST-350

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- 8 -

File No. R-47-ST-375

Project 606E

Date 3 18 53

Aircraft Designation B-47

Antenna Type Stub

Antenna Location Top of Vertical Stabilizer

Remarks

Full Scale Frequency 375 Mc

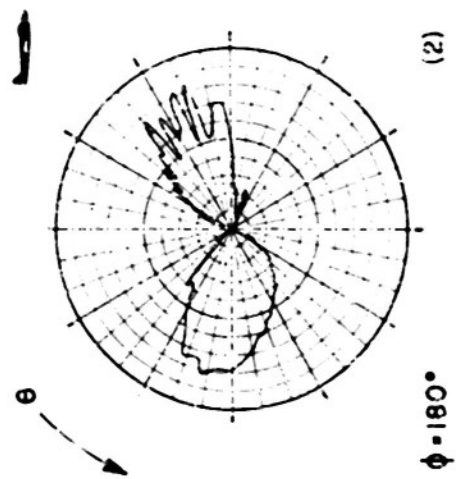
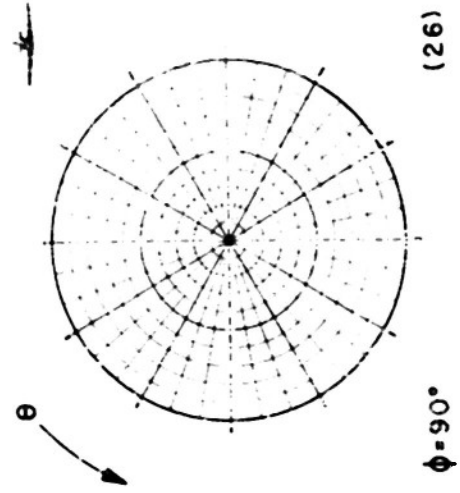
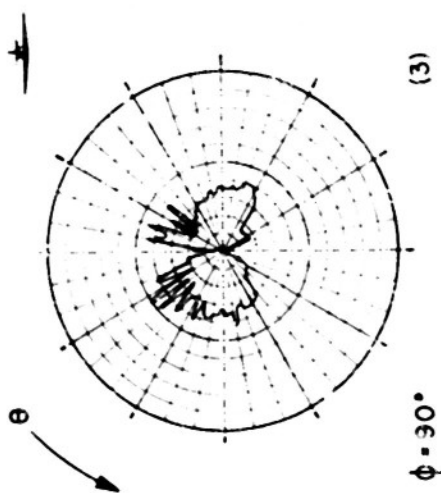
Scale Factor 20

Model Frequency 7500 Mc

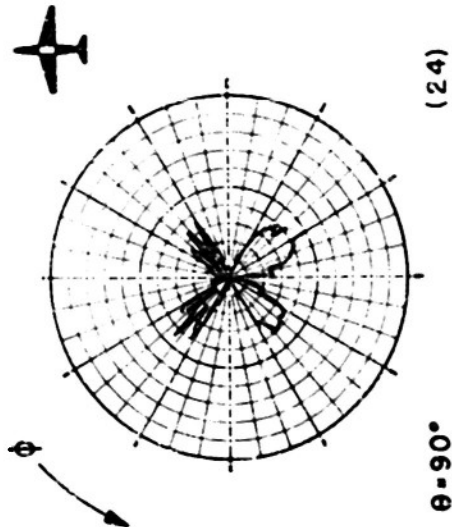
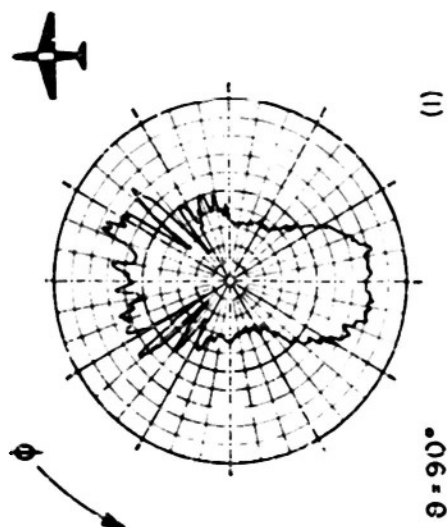
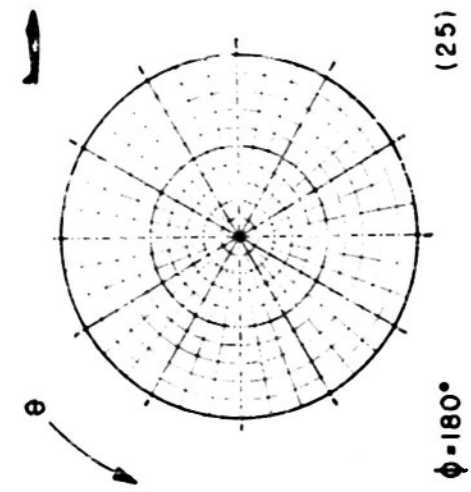
Curves Plotted In Field

Data Taken By E. Wright

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$E_\theta$  POLARIZATION



$E_\phi$  POLARIZATION  
FILE NOS. B47-ST-375